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PUBLIC HEALTH REPORTS

VOL. 37 APRIL 21, 1922 No. 16

CORRECTING PHYSICAL DEFECTS IN SCHOOL CHILDREN.

A STUDY OF THE RESULT OF THE CORRECTION OF CERTAIN PHYSICAL DEFECTS ON THE GROWTH AND DEVELOPMENT OF 146 SCHOOL CHILDREN IN BALTIMORE, MD.[1]

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INTRODUCTION.

Heretofore it has been considered almost an axiom that the correction of the hampering physical defects of children will be followed by an increase in the rate of growth as represented by height and weight, because it seems logical that this should be so. However, there has been no general attempt made to test this assumption in actual experience. The present study was undertaken for the purpose of attempting such a test, or rather as a beginning of such a test, in the hope that other workers might be stimulated to make similar observations. It is obvious, of course, that an accumulation of exact information regarding the effect of measures for the relief of the remediable physical defects most frequently observed in examinations of children of preschool and school age will be the most potent argument for their correction and will give additional assurance to parents of the necessity for such relief. Of even greater importance is the need of a scientific evaluation of preventive measures such as these; for it is believed that insufficient attention has been paid to the determination of the real efficacy of many of the preventive measures that have been proposed and practiced.

The present study is of interest not so much because of the results it affords for a limited number of children, but because it may suggest practicable and simple methods for making the necessary observations for determining whether or not a specific remedial measure actually has the hoped-for results. It should be regarded, therefore, as a preliminary inquiry.

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[1] From Field Investigations in Child Hygiene, United States Public Health Service. - The statistical analysis of the results of this study was made in the Statistical Office of the United States Public Health Service.

NUMBER OF CHILDREN AND TYPE OF DEFECTS.

In April, 1920, 200 children in Baltimore, from 7 to 14 years of age, were selected for corrective work, preceding a series of measurements of height and weight. It was planned to make measurements before corrective work and at intervals of a month succeeding corrections, except in the cases of removal of adenoids and tonsils, when the interval between measurements was to be two weeks. Table I shows the number of children having specified defects and various combinations of defects.

Table I.—*Distribution of 200 children selected for corrective work, according to the nature of the defect.*

Nature of defect.	Number of children having specified defects.
Adenoids	7
Adenoids, tonsils	6
Adenoids, tonsils, teeth	16
Adenoids, tonsils, teeth, vision	2
Adenoids, tonsils, vision	1
Adenoids, tonsils, vision, hearing	1
Adenoids, teeth	10
Tonsils	12
Tonsils, teeth	15
Tonsils, teeth, vision	2
Tonsils, teeth, hearing	3
Tonsils, teeth, vision, hearing	2
Tonsils, vision, hearing	1
Teeth	70
Teeth, vision	10
Teeth, vision, hearing	7
Vision	11
Vision, hearing	3
Hearing	11
Hernia	3
Special	5
Bronchitis	2
Total number of children	200

THE HOME AND SCHOOL ENVIRONMENT.

The 200 children were in two groups which were located in widely separated sections of the city. School No. 25, at Bond Street and Eastern Avenue, is in a part of the city that at one time was a good residential section but now has many factories, stores, and lumber yards. It is within a few blocks of the water front and a market. The large old houses are used as tenements, each house sheltering several families. Little attention is paid to bathtubs or to adequate toilets, and the supply of water is usually limited to one tap on each floor. The facilities for housekeeping are poor. Many homes have no gas, and only one has electric lights.

The schoolhouse is an old building with practically no playground; cars and a railroad siding are on the street. The building is in poor repair, the rooms are small and crowded, poorly ventilated and lighted.

There is a public bath opposite the school, used constantly by the children, and the city park with swimming pool is within easy access.

The other group, located at School No. 96, has a large modern building, in a good location; no cars pass the school; the streets are quiet and safe and are used as playgrounds to supplement a large sunny school yard. The heating and ventilating facilities for the building seem adequate; each room is well lighted, large, and not crowded. The neighborhood is one of modern two-story homes, one family in each house. Many families own their homes or are buying them. With few exceptions each house has a bath, many are lighted by electricity, and the small back yards are neat and well kept. The neighborhood adjoins open fields and woods and is altogether desirable as a residence section. There are several clothing factories, a button factory, and an abattoir in the neighborhood.

RACE STOCK.

The larger number of children with foreign-born parents was found at School No. 25, but there were many homes at No. 96 where a foreign language was spoken exclusively in the home. Table II shows the distribution of the children according to ancestry.

TABLE II.—*Distribution according to ancestry (racial stock) of children of 2 schools of Baltimore observed in this study.*

Parents.	Both schools.	School No. 96.	School No. 25.
All race stocks	173	78	95
Both native white	73	50	23
Both Polish	23	....	23
Both Italian	14	....	14
Both Jewish (Russian)	32	15	17
Both Austrian	7	1	6
Both German	10	6	4
Both Hungarian	1	1	....
Both Serbian	1	1	....
Mixed parentage	9	4	5
Unknown	3	....	3

NATURE OF CORRECTIONS.

Of the original group of 200 children 146 had corrections and were observed to the end of the year. However, only two groups (adenoid or tonsil corrections and teeth corrections), with a total of 132 children, were large enough to justify a study of the effect of the corrections on the height and weight. Table III shows the corrections made on these children.

TABLE III.—*Corrections made on 132 children included in the tabulation for this study.*

Nature of correction.	Tonsil-adenoid group.	Teeth group.
Number of children	49	83
Total corrections	97	100
Tonsils and adenoids	49	
Teeth	40	83
Glasses fitted	6	9
Ear treated		8
Phimosis	2	

The hernia, hearing, and vision groups were composed of so few children that no attempt was made to tabulate them.[2]

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[2] Of the 200 children originally selected, corrections were made on 154, and 146 of these remained in school to the end of the year for observation; but certain groups, such as those treated for hernia, hearing, and vision, were too small to justify the tabulation of results.

On 46 children no corrections were made for the following reasons:

Reason for not making corrections.	Number of children.		
	Total.	Boys.	Girls.
Left school before any corrective work	19	5	14
Refused treatment	16	10	6
Under physician's care	6	1	5
Treated in clinics	5	3	2
Total	46	19	27

On the remaining 154 children the following 261 corrections were made:

Nature of correction.	Number of cases corrected.
All cases corrected	261
Defective teeth	126
Removal of adenoids and tonsils	49
Tonsils treated, no surgery necessary	12
Adenoids removed	2
Hearing (ear treated)	26
Hernia, no surgery	3
Bronchitis	2
Vision, glasses fitted	26
Vision, no glasses needed	13
Phimosis	2

Eight children left school immediately after corrections had been made. In addition to the 200 children selected for the remedial work, brothers, sisters, and schoolmates asked for corrective work, and whenever it was possible this was done. There were made in this group the following corrections:

24 cases dental corrections.
14 cases glasses fitted.
14 cases tonsils and adenoids removed.
1 case phimosis operation.

Physical defects were corrected in two teachers, the corrections being one for nose and throat and one for teeth.

Four mothers went to the free clinics; three had glasses fitted; one had goiter removed.

One father had dental corrections made in the dental clinic.

There were 1,870 weights and measurements made, 255 visits to schools, 518 visits to homes, 410 visits to clinics and hospitals, 21 visits to welfare agencies, and 6 visits to physicians.

The helpful attitude of the principals of the schools and the cooperation of the class teachers were most gratifying. After an appeal to the Parent-Teacher Club at one school scales were purchased for the use of the school, and the mothers and teachers were anxious to have reports of measures and to talk over the condition of the children. At the other school scales were provided late in the year from funds remaining from Junior Red Cross activities in war work.

HOW CORRECTIONS WERE MADE.

Nine of the tonsil operations were arranged for by the parents after arrangements for examination and admission to the hospital had been made. The other 36 operations for tonsils and two phimosis operations were made without expense to the parents. The city charities assumed expenses for 9 cases of tonsils and adenoid operations; 13 dental corrections were made by private dentists; 19 parents paid the cost of materials used in treatment in the clinics; and 94 cases were without expense to the parents. There was the heartiest cooperation from the hospitals. In some hospitals it was difficult to secure beds; but these institutions looked after the outpatients in their clinics (dental, ear, eye), and hospitals where beds could be secured for operative work were most generous in placing the children. The Franklin Street Ear, Eye, and Throat Infirmary, the Franklin Square Hospital, Johns Hopkins Hospital Free Dispensary, the Harriet Lane and the Henry Phipps Psychiatric Clinic, the Maryland Dental Infirmary, Mercy Hospital, the Presbyterian Eye, Ear, and Throat Infirmary, St. Agnes Hospital, and the University of Maryland Hospital (Children's Clinic and Dental Clinic), cooperated in making the corrections.

SPECIAL PRECAUTIONS.

Arrangement was made whereby the children of this study were exempted from nutrition instruction and from any special hygiene other than the correction of their physical defects, as the Public Health Service purposed to secure the correction of these defects in order to determine the effect their removal might have upon the child's nutrition. No attempt to regulate food was made other than the usual directions given patients by the hospital worker. During the months of April, May, and June, 1921, milk was distributed in the schools at 4 cents a half pint. Few of the children (32) had the milk, as the price was prohibitive; and in no case was the milk provided at home during the holidays or on Saturdays and Sundays.

In November, 1919, when a large number of Baltimore school children were measured under the direction of Dr. E. V. McCollum, of Johns Hopkins University, and in January and February, 1920, when officers of the United States Public Health Service made the physical examinations of these same children, the fathers and many of the mothers were employed at high "war wages"; there was no question of having the money to buy food, although living prices were high. These conditions changed, and in May, 1920, at the time of the first corrective work, a garment-worker's strike left many homes with curtailed incomes. In the latter part of 1920 the unemployment situation became acute. Many families were without regular incomes, while the living costs were still high. There was an actual shortage of food for some of the children; and in the families where an attempt had been made to invest the "war wages" by buying the home, the supply of food was limited. It is thus seen that, in addition to the deliberate failure of the investigators to adopt measures designed to promote the state of nutrition, in order better to evaluate the effect of the correction of certain hampering physical defects on growth and development, the children included in this study were subjected to unusual conditions which tended still further to strengthen the conclusions in respect of the results of this study.

Of the 146 children on the school register in June, 1921, whose corrections had been made, 3 children advanced a year and a half in the school year, 134 children were promoted the usual school grade, and 9 failed of promotion. The children who were not promoted were given mental examinations. Two of the boys were decidedly below the intelligence level for their age, three girls were retarded and very slow, one girl of 9 years seemed to have reached her limit at a 6-year level, and one girl and two boys were of normal intelligence. Of these nine children who failed of promotion, six were already over age for their grade in school. Of the 146 defective children on whom corrections were made, 63 children, or 43 per cent, were over age for their grade and had repeated from one to four years prior to the time corrections were made.

TONSIL AND ADENOID CORRECTIONS.

A total of 49 children who had tonsil or adenoid corrections were weighed and measured at varying intervals before and after the operation. The interval between the first measurement and the time of correction of the defect varied from 6 months to 17 months, and the interval between the correction and the last measurement varied from 1 month to 13 months. In addition to the tonsil and adenoid operations, 40 of these children had dental corrections, 7 had corrections of vision by being fitted with glasses or other treatment, and 2 had phimosis operations. It seemed reasonable, however, to assume that the tonsil and adenoid corrections in these cases were more important than the others, and so the increments in weight and height before this correction were compared with the corresponding increments after the tonsil or adenoid corrections, regardless of the time the other corrections were made.

Table IV shows by sex and age groups the gain in weight (pounds) per child per month and the gain in height (inches) per child per month for a period before and a period after the operation.[3]

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[3] The average is a weighted one, the gain in weight per month for each child being considered in proportion to the number of months he was under observation.

TABLE IV.—*Average gain per month of 49 children with diseased tonsils or adenoids before and after the defects were corrected.*[1]

Age group.	Gain in weight per month (pounds).			Gain in height per month (inches).		
	Both sexes.	Boys.	Girls.	Both sexes.	Boys.	Girls.
7 to 10 years:						
Before correction	0.219	0.261	0.198	0.159	0.177	0.149
After correction	.767	.679	.799	.277	.217	.299
11 to 14 years:						
Before correction	.439	.313	.604	.133	.146	.116
After correction	1.001	.650	1.143	.242	.213	.258
All ages:						
Before correction	.295	.286	.301	.149	.162	.141
After correction	.891	.676	.905	.266	.212	.287

[1] Data in this table are based on the following numbers of children:
10 boys, 7 to 10 years.
23 girls, 7 to 10 years.
7 boys, 11 to 14 years.
9 girls, 11 to 14 years.

49 children.

Owing to the relatively small number of children involved, it was not practicable to use single-year age groups, but two age groups were made, children 7 to 10 years being separated from those 11 to 14 years of age. Ages were calculated to the nearest birthday at the time of the operation.

It is realized that the rate of gain in weight and in height per month varies with the age of the child, and therefore the gain for a period before correction is not strictly comparable with the gain after correction, but the table is introduced as a rough indication of the differences observed in growth before and after the operation.

The 23 girls 7 to 10 years of age gained 0.198 pound per child per month before the operation, whereas after the correction the gain was 0.799 pound, approximately four times as much as before the operation. The difference was not so great for other groups but seems sufficient to be significant.

RATE OF GROWTH OF A SPECIAL GROUP OF CHILDREN.

In order to make a more accurate comparison of the rate of growth before and after the corrections and to show the trend of the growth from month to month, a curve was constructed to show the average weight of certain groups of children for each month or half month for a period immediately before the corrections and for a corresponding period immediately following the corrections.

In order to do this, the calendar dates of the weighings were disregarded, and all weights at the time of correction were brought together and averaged. All weights one month after correction were averaged. Weights at other periods before and after correction were averaged in a similar way to make up a weight curve from six months before correction to six months after correction. In order to do this, certain missing weights had to be supplied by interpolation. This was done on a straight line basis—that is, the assumption was made that a child gained or lost an equal number of pounds each month intervening between the actual known weights; for example, if he weighed 55 pounds one month and 57 pounds two months later, he was assumed to weigh 56 pounds the intervening month, the average of the two known weights. A group of 20 girls 7 to 10 years old who had height and weight records for six months preceding the operation and for six months following the operation were tabulated in this way. The resulting average weights, average heights, and the weight-height indexes for a period from six months before the operation to six months after the operation are shown in the first three columns (upper) of Table V. Similar averages were computed for groups of girls 11 to 14 years of age and for boys of similar age groups, although data were not available for the full six months after the operation in all cases. The averages for these groups are shown in the same table.

TABLE V.—*Mean weight, mean height, and weight-height index of 43 children with defective tonsils or adenoids or both, for 6 months before and for 6 months after the operation to correct the defects.*[1]

Time of measurement.	Ages 7–10 years at time of the operation.			Ages 11–14 years at time of the operation.		
	Mean weight (pounds).	Mean height (inches).	Weight-height index (pounds per inch of height).	Mean weight (pounds).	Mean height (inches).	Weight-height index (pounds per inch of height).
GIRLS.						
6 months before operation	45.45	46.57	0.976	66.37	53.87	1.232
5 months before operation	45.77	46.77	.979	66.78	54.00	1.236
4 months before operation	45.98	46.89	.981	67.46	54.05	1.248
3 months before operation	46.17	46.09	.980	68.09	54.13	1.258
2 months before operation	46.35	47.28	.980	68.78	54.24	1.268
1 month before operation	46.28	47.45	.975	69.47	54.35	1.278
Time of operation	46.13	47.63	.969	69.47	54.47	1.275
½ month after operation	46.31	47.86	.968	70.47	54.90	1.284
1 month after operation	47.32	48.28	.980	70.98	55.02	1.290
1½ months after operation	48.56	48.46	1.002	72.21	55.11	1.310
2 months after operation	48.99	48.69	1.006	73.29	55.32	1.325
2½ months after operation	49.36	48.89	1.010	73.80	55.51	1.329
3 months after operation	49.91	49.01	1.018	74.45	55.61	1.339
3½ months after operation	50.31	49.09	1.025	74.73	55.69	1.342
4 months after operation	50.70	49.19	1.031	75.09	55.84	1.345
4½ months after operation	51.03	49.25	1.036	76.22	55.92	1.363
5 months after operation	51.39	49.39	1.040	76.75	56.00	1.370
5½ months after operation	51.54	49.45	1.042	77.81	56.12	1.387
6 months after operation	52.24	49.55	1.054	78.93	56.18	1.405

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[1] Data in this table are based on the following numbers of children:

Girls, total	29
7 to 10 years	20
11 to 14 years	9
Boys, total	14
7 to 10 years	9
11 to 14 years	5

TABLE V.—*Mean weight, mean height, and weight-height index of 43 children with defective tonsils or adenoids or both, for 6 months before and for 6 months after the operation to correct the defects*—Continued.

Time of measurement.	Ages 7-10 years at time of the operation.			Ages 11-14 years at time of the operation.		
	Mean weight (pounds).	Mean height (inches).	Weight-height index (pounds per inch of height).	Mean weight (pounds).	Mean height (inches).	Weight-height index (pounds per inch of height).
BOYS.						
6 months before operation	47.58	47.02	1.012	58.68	51.12	1.148
5 months before operation	48.25	47.21	1.022	58.95	51.27	1.150
4 months before operation	48.47	47.39	1.023	59.27	51.42	1.153
3 months before operation	48.67	47.61	1.022	59.82	51.53	1.161
2 months before operation	49.50	47.79	1.036	59.41	51.65	1.150
1 month before operation	49.39	48.01	1.029	60.34	51.73	1.166
Time of operation	48.61	48.22	1.008	60.30	51.75	1.165
½ month after operation	49.03	48.38	1.013	60.57	51.96	1.166
1 month after operation	49.64	48.42	1.025	60.83	52.02	1.169
1½ months after operation	50.44	48.56	1.039	62.45	52.08	1.199
2 months after operation	50.79	48.60	1.045	62.65	52.29	1.198
2½ months after operation	50.81	48.75	1.042	63.70	52.45	1.214
3 months after operation	51.50	48.86	1.054	64.11	52.52	1.221
3½ months after operation	51.83	48.99	1.058	64.07	52.58	1.219
4 months after operation	52.22	49.28	1.060	....	....	....

In Figures 1 and 2 the weights, the heights, and the weight-height indexes for each group have been plotted on logarithmic scales to show the trend of growth over the period involved. On the logarithmic scale equal distances vertically represent equal *percentage* increases, and therefore the disturbing factor due to the normal expected increase in the absolute gain in weight per month as the child grows older is eliminated. The *steepness* of the curve therefore indicates the *rate* of growth.

The weight in each age group seems to have increased considerably faster after the operation than before, except for the first half-month during which the child had probably not completely recovered from the effect of the operation. The effect on the height does not appear significant, but the weight-height index (weight per inch of height), which remained virtually the same in the 7 to 10 age group for the period preceding the operation, increased considerably after the operation.

In order to show more clearly the differences between the period before and the period after the operation, a straight line (on logarithmic paper) was put through the curve for each period independently by the method of least squares.[4]

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[4] Let y=weight and x=height. Then the equation for the line of equal percentage increase (straight line on logarithmic paper) would be $y=ab^x$, a and b being constants which are evaluated by the method of least squares from the actual weights and heights given in Table V. This equation gives a series of weights at the various heights which, plotted on logarithmic paper, forms a straight line which is the line of equal percentage increase.

This line represents the most probable straight line which could be fitted to the data. It must be remembered, however, that a straight line on logarithmic paper does not represent the line of equal increase in pounds or other unit of weight or height, but represents the line of equal percentage increase. It therefore becomes a matter of interest to compare this average percentage increase per month before the operation with the average percentage increase per month after the operation. Table VI compares these figures for the period before and the period after the operation.

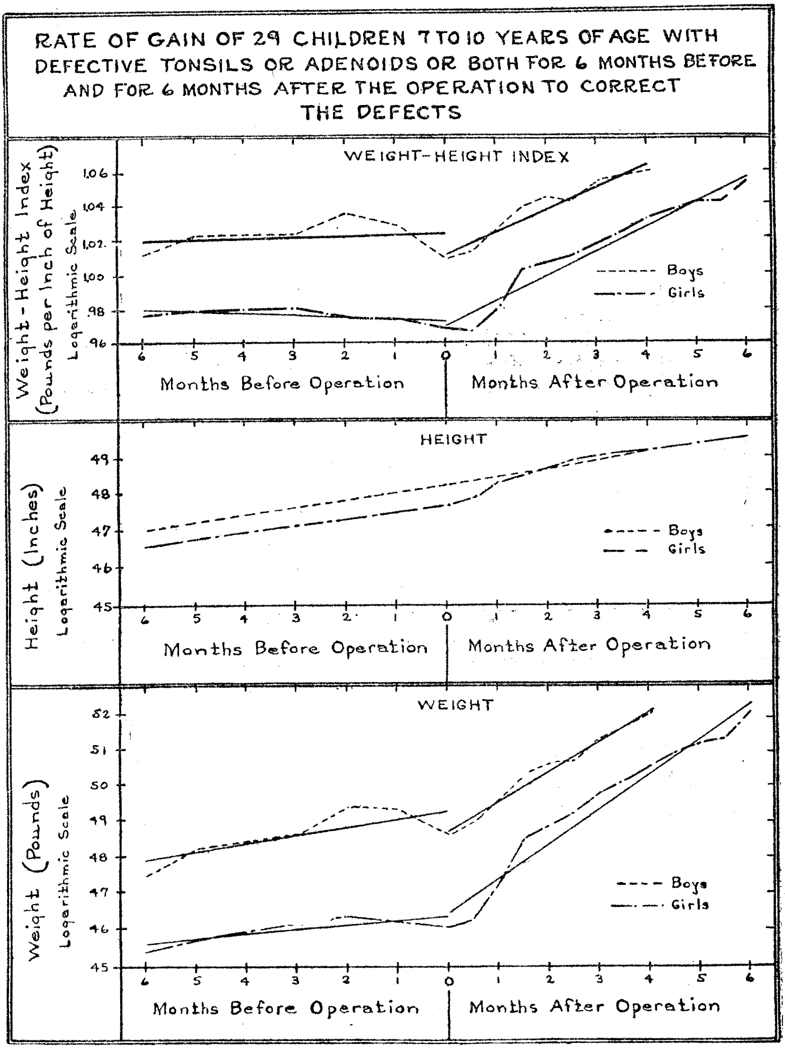

Fig. 1.

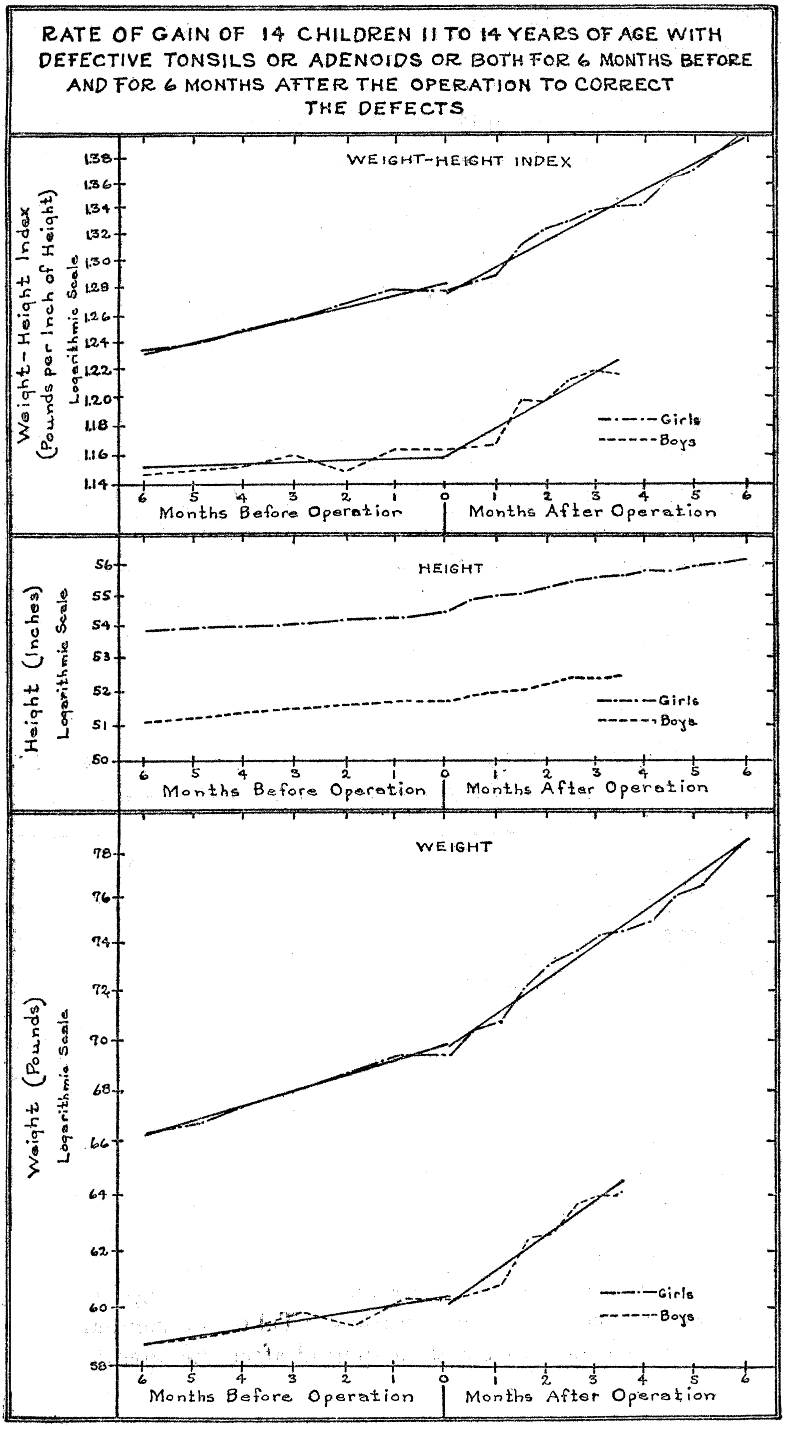
RATE OF GAIN OF 14 CHILDREN 11 TO 14 YEARS OF AGE WITH DEFECTIVE TONSILS OR ADENOIDS OR BOTH FOR 6 MONTHS BEFORE AND FOR 6 MONTHS AFTER THE OPERATION TO CORRECT THE DEFECTS
WEIGHT-HEIGHT INDEX
Weight - Height Index (Pounds per Inch of Height)
Logarithmic Scale
1.38
1.36
1.34
1.32
1.30
1.28
1.26
1.24
1.22
1.20
1.18
1.16
1.14
Girls
Boys
6 5 4 3 2 1 0 1 2 3 4 5 6
Months Before Operation
Months After Operation
HEIGHT
Height (Inches)
Logarithmic Scale
56
55
54
53
52
51
50
Girls
Boys
6 5 4 3 2 1 0 1 2 3 4 5 6
Months Before Operation
Months After Operation
WEIGHT
Weight (Pounds)
Logarithmic Scale
78
76
74
72
70
68
66
64
62
60
58
Girls
Boys
6 5 4 3 2 1 0 1 2 3 4 5 6
Months Before Operation
Months After Operation

Fig. 2.

TABLE VI.—*Average percentage increase per month in weight, in height, and in the weight-height index for a group of 43 children with defective tonsils or adenoids or both, for 6 months before and 6 months after the operation to correct the defects.*

Age group.	Percentage increase per month in—					
	Weight.		Height.		Weight-height index.	
	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.
7 to 10 years:						
Before operation	0.27	0.47	0.37	0.42	[a] −0.12	0.05
After operation	2.05	1.80	.62	.49	1.41	1.29
11 to 14 years:						
Before operation	.84	.47	.18	.21	.67	.26
After operation	1.99	2.04	.48	.46	1.51	1.56

[a] Decrease.

Attention should be called to the difference between this table and Table IV, which shows the actual pounds and inches of increase per month. In Table VI the percentage of increase per month is shown, and the comparison between the two periods (before and after operation) becomes more legitimate because of the elimination of the fact of increasing weights and heights which would add to the *actual* pounds and inches of increase per month as shown in Table IV but would probably not add to the *percentage* increases per month. The fact that the expected or normal percentage of increase in children changes with age is not taken account of, but the total period involved is 12 months (or an average difference of 6 months), and the percentage of increase would not greatly change in this time except as the result of some exceptional event, such as, in these cases, the correction of a physical defect.

In practically all the groups the percentage increases per month in weight, height, and weight-height index are much larger after than before the correction of the defects. In the case of the weight of girls 7 to 10 years of age, the increase before the operation was only about one-fourth of 1 per cent per month, whereas after the operation it was over 2 per cent per month. Other groups show less striking differences, but all show substantial increases after the operation.

CORRECTION OF DENTAL DEFECTS.

Table VII, giving data on 83 children with dental defects, shows by sex and age groups the gain in weight (pounds) per child per month and the gain in height (inches) per child per month for periods before correction and after correction.

Table VII.—*Average gain per month of 83 children with defective teeth, before and after the defects were corrected.*[1]

Age group.	Gain in weight per month (pounds).			Gain in height per month (inches).		
	Both sexes.	Boys.	Girls.	Both sexes.	Boys.	Girls.
7 to 10 years:						
Before correction	0.333	0.353	0.319	0.214	0.228	0.204
After correction	.562	.492	.603	.210	.211	.210
11 to 14 years:						
Before correction	.599	.449	.692	.200	.178	.213
After correction	.811	.765	.856	.193	.288	.157
All ages:						
Before correction	.394	.374	.408	.212	.217	.206
After correction	.617	.568	.649	.206	.215	.200

[1] Data in this table are based on the following numbers of children:

26 boys, 7 to 10 years.
38 girls, 7 to 10 years.
8 boys, 11 to 14 years.
11 girls, 11 to 14 years.

83 children.

In this table, time of operation was the designation for the time of the first extraction, filling, or prophylactic treatment. Intervals between the first measurements and the time of correction varied from 5 to 18 months before the operation, while the intervals between the corrections and the last measures varied from 1 to 14 months. In addition to their dental treatment, 9 children had defects of vision corrected by being fitted with glasses, and 8 children had nonsurgical treatment of the ear. The time these additional corrections were made was not considered in this study of the increase of weight and height.

The 38 girls 7 to 10 years of age gained 0.319 pound per child per month before correction and 0.603 pound per month after correction, while their gain in height was about the same for each period, 0.204 inch before and 0.210 inch after correction. The 11 to 14 year-old group of girls and the boys 7 to 10 years gained more in weight per month in the five months succeeding correction than before correction but did not gain in height as much as before the operation.

RATE OF GROWTH OF A SPECIAL GROUP OF CHILDREN.

Table VIII more accurately compares the rate of growth before and after the correction of dental defects. The data were recorded in the same way as that described in the case of corrections of adenoids and tonsils. The table shows the average weights, heights, and weight-height indexes for a period from five months before the correction to five months after for each group.

TABLE VIII.—*Mean weight, mean height, and weight-height index of 67 children with defective teeth, for 5 months before and for 5 months after correction of the defects was begun.*[1]

Time of measurement.	Ages 7-10 years at time of the operation.			Ages 11-14 years at time of the operation.		
	Mean weight (pounds).	Mean height (inches).	Weight-height index (pounds per inch of height).	Mean weight (pounds).	Mean height (inches).	Weight-height index (pounds per inch of height).
GIRLS.						
5 months before operation	46.44	47.12	0.986	56.76	51.31	1.106
4 months before operation	46.63	47.34	.985	56.80	51.64	1.100
3 months before operation	46.80	47.59	.983	57.65	52.03	1.108
2 months before operation	47.11	47.89	.984	58.16	52.22	1.114
1 month before operation	47.64	48.15	.989	58.68	52.36	1.121
Time of operation	48.33	48.52	.996	58.58	52.67	1.112
1 month after operation	48.97	48.82	1.003	59.96	52.79	1.136
2 months after operation	49.84	48.99	1.017	62.27	53.04	1.174
3 months after operation	50.25	49.20	1.021	63.58	53.17	1.196
4 months after operation	50.48	49.40	1.022	63.23	53.31	1.186
5 months after operation	51.39	49.59	1.036	63.81	53.41	1.195
BOYS.						
5 months before operation	47.67	47.58	1.002	61.54	53.91	1.141
4 months before operation	48.05	47.83	1.005	61.81	54.30	1.138
3 months before operation	48.25	48.07	1.004	62.60	54.57	1.147
2 months before operation	48.56	48.36	1.004	63.66	54.78	1.162
1 month before operation	49.04	48.61	1.009	64.46	54.91	1.174
Time of operation	49.57	48.85	1.015	65.46	55.25	1.185
1 month after operation	50.55	49.12	1.029	66.51	55.37	1.201
2 months after operation	51.11	49.36	1.035	67.19	55.45	1.212
3 months after operation	51.47	49.50	1.040	68.89	55.64	1.238
4 months after operation	51.92	49.71	1.044	69.82	55.86	1.250
5 months after operation	52.23	49.88	1.047	69.57	56.13	1.239

[1] Data in this table are based on the following numbers of children:

Girls (total)	38
7 to 10 years	32
11 to 14 years	6
Boys (total)	29
7 to 10 years	22
11 to 14 years	7

Figures 3 and 4 show the weight, height, and weight-height index of the children with defective teeth, plotted on logarithmic scales to show the trend of growth over the ten months involved.

The fact that the corrective dental work in most cases extended over a period of time would tend toward a less clear-cut distinction between the period before and the period after the correction than in the case of the tonsil and adenoid operations. The time the correction of the defects was begun was taken as the dividing line, and in some cases the completion of the dental work was much later. But there are some differences which appear to be significant, particularly in the weight and weight-height index for girls in both age groups. In other cases the differences are small.

In order to show the differences more accurately, straight lines (on logarithmic paper) were fitted to the actual data in the manner

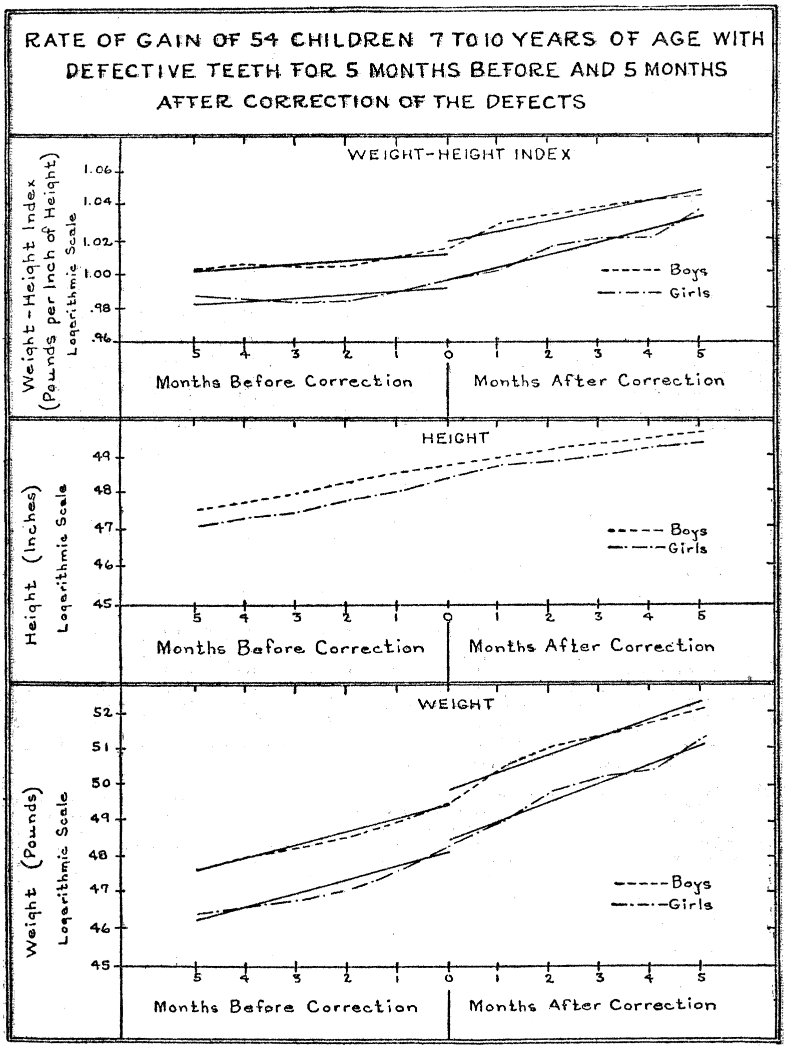

Fig. 3.

described in the discussion of the adenoid and tonsil cases. Table IX shows the percentage increase per month before and after the corrections in the same way as Table VI shows it for the adenoids and tonsils.

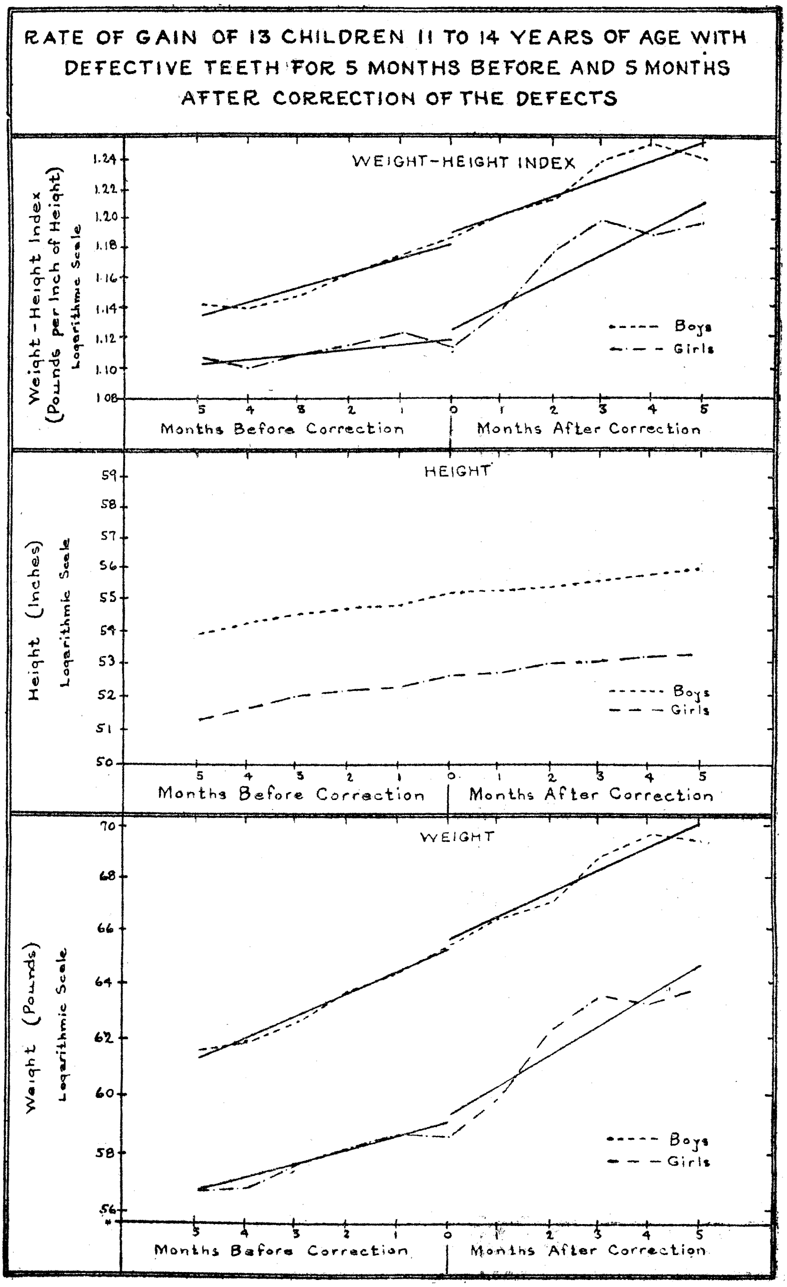
RATE OF GAIN OF 13 CHILDREN 11 TO 14 YEARS OF AGE WITH DEFECTIVE TEETH FOR 5 MONTHS BEFORE AND 5 MONTHS AFTER CORRECTION OF THE DEFECTS
WEIGHT-HEIGHT INDEX
Weight-Height Index (Pounds per Inch of Height) Logarithmic Scale
1.24
1.22
1.20
1.18
1.16
1.14
1.12
1.10
1.08
Boys
Girls
5 4 3 2 1 0 1 2 3 4 5
Months Before Correction
Months After Correction
HEIGHT
Height (Inches) Logarithmic Scale
59
58
57
56
55
54
53
52
51
50
Boys
Girls
5 4 3 2 1 0 1 2 3 4 5
Months Before Correction
Months After Correction
WEIGHT
Weight (Pounds) Logarithmic Scale
70
68
66
64
62
60
58
56
Boys
Girls
5 4 3 2 1 0 1 2 3 4 5
Months Before Correction
Months After Correction

Fig. 4.

Table IX.—*Average percentage increase per month in weight, in height, and in the weight-height index, for a group of 67 children with defective teeth, for 5 months before and 5 months after correction of the defects was begun.*

Age group.	Percentage increase per month in—					
	Weight.		Height.		Weight-height index.	
	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.
7 to 10 years:						
Before operation	0.78	0.75	0.58	0.53	0.18	0.22
After operation	1.17	1.00	.43	.41	.74	.58
11 to 14 years:						
Before operation	.76	1.30	.50	.46	.26	.85
After operation	1.75	1.37	.29	.31	1.46	1.05

PHYSICAL DEFECTS AMONG 8,887 UNDERWEIGHT SCHOOL CHILDREN.[1]

Early in 1922 the medical inspectors of the department of health of Detroit completed the physical inspection of 8,887 school children who were found to be 15 per cent or more underweight according to the measurements made during September and October, 1921, on the school children of Detroit. This number found to be 15 per cent or more underweight is 7.9 per cent of the school children of Detroit.

Because of the great variations frequently met with in the reported prevalence of physical defects among school children, an effort was made to secure uniformity in reporting. In some instances, it was stated, 30 per cent of tonsillar defects had been reported for one school by one investigator, and only 5 per cent for another school a few blocks away by another investigator—a variation due to the difference in the interpretations of medical inspectors. In order to secure uniformity and therefore make records for different schools comparable, the department of health devised a simple plan of designating various degrees of defects, and arranged for the examiners to work in teams of three each. These men examined independently the same groups of children, reporting the defects found in terms of the definite graded scales, and they met at intervals to check up their independent work.

One physical defect or more was found among 6,662, or 74.9 per cent, of the 8,887 underweight children. No outstanding physical defect was found among 2,225, or 25.1 per cent.

The number of each of the more important defects per 1,000 children was given as follows:

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[1] Taken from the Weekly Health Review, Feb. 18, 1922, published by the Department of Health of Detroit.